ROUND 9

TOSS-UP

1) MATH  Short Answer  Find the product of $2^3 \times 3^2$:

ANSWER: 72

BONUS

1) MATH  Short Answer  Arrange the following 4 choices in INCREASING order:
200$^1$; $5^3$; $3^5$; $20^2$

ANSWER: $5^3$; 200$^1$; $3^5$; $20^2$

TOSS-UP

2) GENERAL SCIENCE  Multiple Choice  A blimp or airship that uses helium as its lifting gas primarily controls its buoyancy by doing which of the following:

W) adding or removing small amounts of hydrogen gas because it is lighter than helium
X) heating or cooling the helium gas within the outside bladder of the blimp
Y) intaking or venting air
Z) producing or destroying helium gas

ANSWER: Y) INTAKING OR VENTING AIR

BONUS

2) GENERAL SCIENCE  Short Answer  Arrange the following 4 choices from the one with the LOWEST mass to the HIGHEST mass: virus; mouse spleen; mosquito; water molecule

ANSWER: WATER MOLECULE; VIRUS; MOSQUITO; MOUSE SPLEEN
TOSS-UP

3) LIFE SCIENCE  Short Answer  What is the most common name for the junctions across which nerve cells carry chemical messages from cell to cell?

ANSWER: SYNAPSE

BONUS

3) LIFE SCIENCE  Short Answer  What is the most common name of the part of a neuron that takes its name from the Greek word for tree, and functions to carry electrical messages from other nerve cells to the soma?

ANSWER: DENDRITE

TOSS-UP

4) PHYSICAL SCIENCE  Multiple Choice  A fifty-fifty solution of distilled water and pure ethanol will appear:

W) clear
X) cloudy
Y) purple
Z) heterogeneous

ANSWER: W) CLEAR

BONUS

4) PHYSICAL SCIENCE  Multiple Choice  Which of the following chemical names is NOT correctly matched with its chemical formula:

W) $\text{H}_2\text{SO}_4$ and sulfuric acid
X) $\text{HCl}$ and hydrochloric acid
Y) $\text{BeCl}_2$ and boron dichloride
Z) $\text{SO}_2$ and sulfur dioxide

ANSWER: Y) $\text{BeCl}_2$ AND BORON DICHLORIDE
TOSS-UP

5) EARTH SCIENCE  *Multiple Choice*  Which of the following is a feature made by a continental glacier and NOT made by an alpine glacier:

W) cirque  
X) hanging valley  
Y) truncated spur  
Z) drumlin

ANSWER: Z) DRUMLIN

BONUS

5) EARTH SCIENCE  *Short Answer*  What type of moraine forms along the valley walls of an alpine glacier?

ANSWER: LATERAL  (DO NOT ACCEPT ANY OTHER MORAINES TYPE)

TOSS-UP

6) MATH  *Short Answer*  Evaluate $| -x |$ (read as: the absolute value of negative $x$) for $x = -5$:

ANSWER: 5

BONUS

6) MATH  *Short Answer*  Maxine buys a stock for $100.00 and then sells it for $75.00. She repurchases the stock for $125.00, and 3 months later sells it for $200.00. What was her profit, in dollars?

ANSWER: 50

(Solution: $-100 + 75 - 125 + 200 = $50.00)
TOSS-UP

7) GENERAL SCIENCE  *Short Answer*  What is the physical state of a saturated fat and a polyunsaturated fat, respectively, at room temperature, if both have 18 carbons per molecule?

ANSWER: SATURATED FAT = SOLID; UNSATURATED FAT = LIQUID

BONUS

7) GENERAL SCIENCE  *Multiple Choice*  Which of the following is closest to the maximum running speed of a human:

W) 0.3 meters per second  
X) 30 meters per second  
Y) 18 kilometers per hour  
Z) 38 kilometers per hour

ANSWER: Z) 38 KILOMETERS PER HOUR

TOSS-UP

8) LIFE SCIENCE  *Multiple Choice*  In which of the following cells would myelin most likely be found:

W) oocyte  
X) red blood cell  
Y) neuron  
Z) skin cell

ANSWER: Y) NEURON

BONUS

8) LIFE SCIENCE  *Short Answer*  Name all of the following 4 choices of eukaryotic sub-cellular structures that do NOT have their own specific membrane: chloroplast; lysosome; centriole; golgi

ANSWER: CENTRIOLE
TOSS-UP

9) PHYSICAL SCIENCE  Short Answer  How many times as much momentum does a truck have traveling at 40 kilometers per hour if it triples its mass?

ANSWER: 3

BONUS

9) PHYSICAL SCIENCE  Short Answer  Name all of the following 4 substances that will turn blue litmus paper red: citric acid; carbonated water; ammonia; sodium hydroxide

ANSWER: CITRIC ACID; CARBONATED WATER

TOSS-UP

10) EARTH SCIENCE  Multiple Choice  The hard coral of coral reefs are primarily made of:

W) basalt
X) calcium carbonate
Y) silicates
Z) halite

ANSWER: X) CALCIUM CARBONATE

BONUS

10) EARTH SCIENCE  Multiple Choice  According to the Rock Cycle, once conglomerate sedimentary rocks are formed, the most direct pathway in the formation of sediments is by which of the following:

W) weathering and erosion
X) compaction and cementation
Y) cooling and crystallization
Z) heat and pressure

ANSWER: W) WEATHERING AND EROSION
TOSS-UP

11) MATH  Multiple Choice  Which of the following is NOT true:

W) a line that intersects 2 other lines at different points is called a transversal
X) if $a \leq 0$ (read as: if $a$ is less than or equal to 0), then the absolute value of $a$ equals $a$
Y) the square of an integer is called a perfect square
Z) the real numbers include all rational and irrational numbers

ANSWER: X) IF $A \leq 0$ THEN THE ABSOLUTE VALUE OF $A$ EQUALS $A$

BONUS

11) MATH  Short Answer  A college student has a budget of $600.00 per month. If at the end of a given month she spent $350.00 and earned an extra $150.00 in wages, how much is left in the budget at month’s end?

ANSWER: $400.00

TOSS-UP

12) GENERAL SCIENCE  Short Answer  What fossil fuel is the greatest fuel source for electricity generation in the world?

ANSWER: COAL

BONUS

12) GENERAL SCIENCE  Short Answer  The acidity of a water sample with a pH of 5 is how many times as great as that of a sample with a pH of 6?

ANSWER: 10
TOSS-UP

13) LIFE SCIENCE  *Multiple Choice*  What is the most important function of fiber tracheids (read as: TRAY-key-ids) in woody plants:

W) energy storage  
X) structural support  
Y) sugary sap movement  
Z) absorption of nutrients from the soil

ANSWER: X) STRUCTURAL SUPPORT

BONUS

13) LIFE SCIENCE  *Multiple Choice*  Which of the following is the smallest object that a typical student compound light microscope is able to allow a person to see:

W) mRNA  
X) ribosomes  
Y) *E.coli*  
Z) polio virus

ANSWER: Y) *E.COLI*

TOSS-UP

14) PHYSICAL SCIENCE  *Short Answer*  According to Charles’s gas law, the volume of a fixed amount of gas varies directly with what property?

ANSWER: TEMPERATURE

BONUS

14) PHYSICAL SCIENCE  *Multiple Choice*  Which of the following processes is exothermic:

W) solid water changes to water vapor  
X) solid water changes to liquid water  
Y) liquid water changes to solid water  
Z) liquid water changes to water vapor

ANSWER: Y) LIQUID WATER CHANGES TO SOLID WATER

(Solution: freezing is exothermic)
TOSS-UP

15) EARTH SCIENCE  Multiple Choice  An igneous rock in which individual mineral grains or crystals are visible to the naked eye most likely was formed by which of the following processes:

W) rapid cooling
X) slow cooling
Y) quenching
Z) metamorphosis

ANSWER: X) SLOW COOLING

BONUS

15) EARTH SCIENCE  Short Answer  What type of boundary exists where plates are neither produced nor destroyed, an example of which is the San Andreas fault?

ANSWER: TRANSFORM FAULT BOUNDARY  (ACCEPT: TRANSFORM MARGIN or TRANSFORM )

TOSS-UP

16) MATH  Short Answer  By words or number, name all of the following 3 statements which are always TRUE:

1) the smaller angle formed by the hands of a clock at 2 o’clock is acute
2) two non-vertical parallel lines have the same slope
3) an altitude of an equilateral triangle forms two, 45°, 45°, 90° triangles

ANSWER: 1 AND 2

BONUS

16) MATH  Short Answer  If a staple-gun misfires 5 times for every 200 shots, how many times will it be expected to misfire in 4,000 shots?

ANSWER: 100
TOSS-UP

17) GENERAL SCIENCE  *Short Answer*  If a star has a mass of 10 solar masses, how many times as much mass does it have as the Sun?

ANSWER: 10

BONUS

17) GENERAL SCIENCE  *Multiple Choice*  The majority of stars in the universe are thought to have surface temperatures of:

W) about 20,000 K
X) about 10,000 K
Y) about 6,000 K
Z) less than 3,500 K

ANSWER: Z) LESS THAN 3,500 K

TOSS-UP

18) LIFE SCIENCE  *Multiple Choice*  Adipose tissue stores mostly:

W) lipid
X) protein
Y) starch
Z) glycogen

ANSWER: W) LIPID

BONUS

18) LIFE SCIENCE  *Multiple Choice*  Which of the following biological molecules make up the main part of the bilayer and hydrophobic region of the plasma cell membrane:

W) oligosaccharides (read as: oh-LEE-go-SACK-ah-rides)
X) carbohydrates
Y) phospholipids
Z) proteins

ANSWER: Y) PHOSPHOLIPIDS
TOSS-UP

19) PHYSICAL SCIENCE  Short Answer  Giving your answer in scientific notation to the second decimal place, how many molecules are in 10 moles of H₂O?

ANSWER: 6.02 × 10²⁴

(Solution: (10 mol H₂O)(6.023 × 10²³ molecules/mole) = 6.023 × 10²⁴ molecules)

BONUS

19) PHYSICAL SCIENCE  Short Answer  Using proper chemical formulas, finish balancing the following equation: N₂ + 3H₂ → what?

ANSWER: 2NH₃

TOSS-UP

20) EARTH SCIENCE  Multiple Choice  Which of the following forms of winter precipitation is most likely to cause downed power lines and broken tree limbs:

W) freezing rain
X) sleet
Y) snow
Z) hail

ANSWER: W) FREEZING RAIN

BONUS

20) EARTH SCIENCE  Multiple Choice  Which of the following is NOT one of the 10 major cloud types:

W) cirrus
X) cirrocumulus
Y) cirrostratus
Z) cirronimbus

ANSWER: Z) CIRRONIMBUS
TOSS-UP

21) MATH  Short Answer  Solve the following inequality for $x$:  $3(x + 1) \geq 9$

ANSWER:  $x \geq 2$

BONUS

21) MATH  Short Answer  Evaluate the following complex fraction, giving your answer as an improper fraction in lowest terms:

$$\frac{2 - \frac{1}{7}}{1 - \frac{1}{2}}$$

ANSWER:  $\frac{26}{7}$

TOSS-UP

22) GENERAL SCIENCE  Short Answer  What is the name for the time zone immediately east of the Eastern Time Zone?

ANSWER:  ATLANTIC TIME ZONE (ACCEPT: ATLANTIC)

BONUS

22) GENERAL SCIENCE  Short Answer  Ignoring boundary adjustments, most individual time zones are how many degrees of longitude apart?

ANSWER:  15
TOSS-UP

23) LIFE SCIENCE  *Multiple Choice* Keratins are considered structural proteins. This is because they are most often arranged in which of the following shapes:

W) long, thin fibers  
X) spherical and smooth  
Y) short and irregular  
Z) small, irregular, and hydrophilic

**ANSWER:** W) LONG THIN FIBERS

**BONUS**

23) LIFE SCIENCE  *Short Answer* Name all of the following 4 molecules that are storage forms of glucose: starch; wax; glycogen; maltose

**ANSWER:** STARCH; GLYCOGEN

______________

TOSS-UP

24) PHYSICAL SCIENCE  *Short Answer* What is the name of the particle that carries the electromagnetic force?

**ANSWER:** PHOTON

**BONUS**

24) PHYSICAL SCIENCE  *Short Answer* If a wave has a frequency of 2,000 hertz, what is its period, in seconds?

**ANSWER:** 0.0005  (ACCEPT: $5 \times 10^{-4}$)

(Solution: period = 1/f)
TOSS-UP

25) EARTH SCIENCE  Multiple Choice  Which of the following is indicated by the following forecast: “A front moves through New England Monday with a few showers. Chillier air moves in behind the front gradually changing to lake-effect snows, followed by clear skies on Tuesday”:

W) cold front  
X) warm front  
Y) stationary front  
Z) inverted front

ANSWER: W) COLD FRONT

BONUS

25) EARTH SCIENCE  Multiple Choice  Which of the following is CLOSEST to the estimate of how many million years ago the first bacteria appeared on Earth:

W) 65  
X) 280  
Y) 1,500  
Z) 3,800

ANSWER: Z) 3,800